

Name: _____

Date: _____

Oceans

Extra Notes:

What technology is used to study the oceans?

- Exploring by ship
- Compass (navigation)
- Scuba gear (exploring underwater)
- _____, **sound navigation and ranging** (detecting submarines and mapping the ocean with sound waves)
- Deep sea dive in a steel ball
- NOW: Submersible vehicles with humans; remotely operated vehicles from ship on the surface; _____
_____ - using satellites to photograph data from the ocean.

What factors have limited man's ability to learn and map the ocean completely?

- **Remote Sensing:** using satellites or aircraft to gather data from afar.

Then when the scientist goes to the site to verify it is called....

ground truthing.

Ex: Mapping ocean _____ temperatures.

Waves, Tides, Currents

- **Waves** are a movement of _____ through a body of water.
- **Size of wave:** Determined by the strength of the _____ and the length of _____ it blows.
- The **energy** moves *toward the shore* but the water remains in place.

Near the shore:

- Wave _____ Increases ↑
- _____ decreases ↓

...as the wave's energy runs out of seafloor.

What is a **tsunami**?

- A giant wave cause by an underwater _____.

Waves shape a beach by erosion and deposition.

What are **tides**?

- The daily _____ and _____ of earth's waters on its coastlines
- Caused by: The interaction of _____ of the earth, moon, and sun.

The earth, moon, and sun change positions over the course of a _____ month thus affecting the tidal _____ in a month.

- **Spring Tides:**

Spring tides occur when all three are in a horizontal alignment (earth, moon, and sun).

The distance between high and low tide is at its _____.

- **Neap Tides:**

Neap tides occur when the sun, earth, and moon are at a _____ angle.

There is the least difference between high and low tide at neap tides.

What are **surface currents**?

- Surface currents affect water to a _____ of several hundred meters.
- They are driven by the _____.

What is the **Coriolis Effect**?

- Currents move in _____ patterns due to the _____ of the Earth.
- It causes the winds and currents to _____.

The Gulf Stream in the Atlantic:

- Largest _____ current carrying water from the Gulf of Mexico to the northeast.
- It _____ the climate of many coastlines as it travels north. Ex: Norway is warmer than nearby countries due to the Gulf Stream

What is El Nino?

- Abnormal _____ event that occurs every 2-7 years in the Pacific.
- The unusual pattern of _____ causes a large layer of warm water to move toward South America.
- Causes weather problems worldwide.

What are **deep water currents**?

- Caused by dense _____ water that sinks to the bottom and moves towards the poles.
- Takes _____ of years for the deep water currents to circle from pole to equator and back.

_____ differences in ocean water are due to salinity, temperature and depth of the water.

What are **upwellings**?

- Bring cold water to the _____ in the open ocean.
- Along with the movement of water, _____ and food for fish are brought to the surface.
- Fish follow upwellings.

Ocean Chemistry

- Ocean averages ____ to ____ parts salt to parts water.
- _____ is defined as the total amount of dissolved salts in water.
- Sea water has a _____ density than freshwater and freezes at a _____ temperature.
- **Estuarine** water is a mix of _____ & ocean water.

Surface Waters

- Become _____ with freshwater after storms, rain, or where rivers dump into the sea.

Salinity

- Affected by _____ and _____ of the water.

Gases

- Are found in ocean water.
- The CO₂ and O₂ cycle occurs to supply _____ oxygen to animals and CO₂ to plants in the ocean.

Cold water contains _____ dissolved oxygen than warmer water.

Salts in the ocean → NaCl, NaSO₄, CaCl₂, KCl, . . .

_____ Water: 100-500 meters deep ~17.5°C

_____ Zone: 500 meters to 1 km deep ~4°C

_____ Zone: 1 km to seafloor ~ -3.5°C

Ocean Habitats and Zones

- **Intertidal Zone** – from _____ tide line to _____ tide line
 - Organisms must be able to handle changes in _____ and temperature
Ex: hermit crabs, algae, sea anemones
 - _____ – coastal inlets where fresh water from rivers mix with salty water
“Brackish water”
 - **Salt Marshes** – ooze with smelly _____ from plant and animal matter

Fish, crabs, shrimp, oysters all hatch and feed before going to ocean
- **Neritic Zone** – From low tide line to edge of _____ shelf
 - Has more organisms than any other ocean zone.
(most _____ is done here)
 - Has large amounts of _____ from upwelling & algae

- _____ **reefs** – made of tiny animals that grow on top of each other
Only in shallow tropical water, grow a few mm/yr
Helps protect coastlines by breaking up surf during storms
- _____ **Forests** – need cold Neritic water with rocky floor (*Pacific coast Alaska to Mexico*)
- **Open Ocean Zone** – Begins at _____ of continental shelf
 - Supports fewer organisms
 - **Bioluminescence** – production of _____ by living things
Ex: angler fish (*Finding Nemo*), vampire squid (*Planet Earth* video in class)
 - _____ **vents** – hot water through cracks in the ocean floor
 - Bacteria feed on chemical nutrients to make food
 - Clams eat bacteria

Plankton

- Diverse classification of _____ algae, krill, jellyfish, young crustaceans, and fish.
- These organisms _____ & _____ with the waves and currents.
 - **Phytoplankton** are algae, diatoms, . . . (plants)
 - **Zooplankton** are animal.

Nekton

- Classification of _____ fish, mammals, reptiles, . . .
- They are animals that can move _____ throughout the ocean.
Ex. Squid, whales, sharks, fish, seals, . .

Benthos

- Animals that live on the _____.
- Some benthos move _____.
Lobsters, sea stars, crabs would be an example.
- Some benthos are attached like sea anemones, corals, sponges.

Ocean Pollution:

- Only _____ of all pollutants in the waterways are caused by water activities.
- Of that, _____ account for much of the 20% with grey water, raw sewage and bilge water.
- _____ water refers to wastewater full of detergents, soaps, . . . Bilge water includes oil, diesel fuel, and other pollutants.
- _____ endangers marine wildlife.

Estimates include:

100,000 deaths/year marine mammals
1,000,000 death/year sea birds
3-4,000,000 deaths/year of fish

- _____ pollution is ingested by marine animals and blocks the digestive tract or effects the swim bladder
- Fishing line, six pack rings, abandoned traps entangle birds and fish by the _____.
- Ghost fishing traps marine mammals causing them to _____.